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INTERNATIONAL SEARCH REPORT

Int nal Application No
PCT/US 99/28913

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06K11/18 G06F3/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06K G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 222 400 A (HILTON JOHN A) 29 June 1993 (1993-06-29) column 5, line 5 -column 6, line 62 figures 1-4	1,6
A		2-4,13, 16
Y	US 4 536 746 A (GOBELI GARTH W) 20 August 1985 (1985-08-20) column 3, line 59 -column 6, line 40 figures 1-8B	1,6
A		13,16

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 May 2000	26/05/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Baldan, M

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Information on patent family members

Int[illegible]nal Application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5222400 A	29-06-1993	US 5591924 A	07-01-1997
		WO 9304348 A	04-03-1993
		US 5452615 A	26-09-1995
		US 5706027 A	06-01-1998
		DE 3687571 T	04-03-1993
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		JP 62177426 A	04-08-1987
		US 4811608 A	14-03-1989
US 4536746 A	20-08-1985	NONE	

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(71) Applicant and
(72) Inventor: ARMSTRONG, Brad, A. [US/US]; P.O. Box 1419, Paradise, CA 95967 (US).

(74) Agents: HAHN, Peter, K. et al.; Luce, Forward, Hamilton & Scripps LLP, Suite 2600, 600 West Broadway, San Diego, CA 92101 (US).

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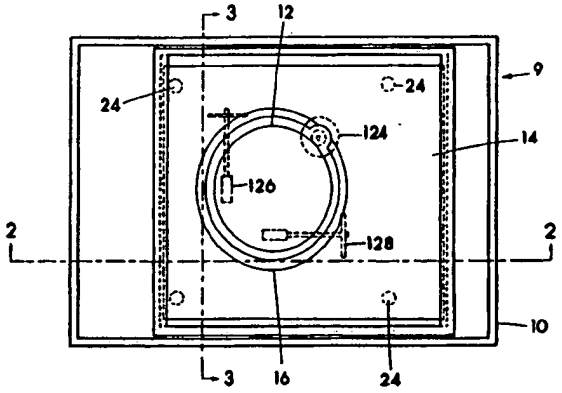
Published:
— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: 6 DOF GRAPHIC CONTROLLERS WITH SHEET CONNECTED SENSORS



(57) Abstract: A sensor connecting sheet material for inclusion in appropriately structured multiple-axes controllers comprised of a single input member operable in 6 DOF relative to a reference member of the controller. The input member having return-to-center resiliency relative to the reference member on at least the three perpendicular linear axes. The input member can be of a continuously rotatable trackball-type or a limited rotation joystick-type, and the reference member can be a shaft, a base or a housing. The controllers include carriage structuring for influencing sheet connected sensors by hand-applied operation of the input member. The preferred structures provide cooperative interaction with movement or force influenced sensors in primarily a single area. Some, most, or all of the sensors are preferably supported on a generally single plane, such as on a printed flexible membrane sensor sheet or circuit board sheet. In an alternative embodiment, sensors and conductive traces are applied on a generally flat, flexible membrane sensor sheet, which is then bent into a three dimensional configuration which may in some cases reach a widely-spread 3-D constellation of 6 DOF and/or other sensor mountings. The use of sensors connected by a sheet member, whether finally applied in a flat or 3-D configuration, enables efficient circuit and sensor connection and placement during manufacture, resulting in low product costs and high reliability.

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